

Progress in Water Pollution Control

By **CARL E. SCHWOB, M.S.,** and **LEONARD B. DWORSKY, B.S.**

"Water pollution has become a matter of grave concern in many areas, and its damaging effects on the public health and natural resources are a matter of definite Federal concern as a menace to national welfare. Abatement must be undertaken in order to control it." So stated the Senate Committee on Public Works in its report (S. Rept. 462, 80th Cong.) on the bill which was later enacted as the Water Pollution Control Act of 1948.

Recognizing this Federal concern, but also the primary responsibilities of the States in controlling water pollution, this act authorized the Public Health Service to take the initiative in developing or adopting comprehensive programs for the solution of water pollution problems in cooperation with the States, interstate agencies, municipalities, and industries. The act stated that comprehensive programs were to be developed for surface and underground waters, giving due consideration to all water uses—public water supply, propagation of fish and aquatic life, recreation, and agricultural, industrial, and other legitimate uses. It provided for Federal grants to the States and interstate agencies to help them carry out industrial waste studies, and for loans to municipalities to assist in the construction of needed abatement works. The latter provision was included with the intent that "The extension of Federal credit to local agencies for construction

of pollution abatement works will greatly stimulate the construction phase of the comprehensive program and thus encourage the early accomplishment of urgently needed abatement measures" (S. Rept. 462, 80th Cong.).

The act further provided for Federal research and technical and consultative assistance to State and interstate agencies, municipalities and industries, and for the encouragement of uniform State laws, interstate compacts, and cooperative State activities in the field of water pollution control. Initial responsibility for enforcement of pollution control measures was left with the States; Federal authority was to be exercised only on interstate waters, only after the efforts of the States had been exhausted, and only with the consent of the States.

To accomplish these tasks, a Division of Water Pollution Control was set up in the Bureau of State Services of the Public Health Service in Washington, and 10 field units were established, located according to drainage basin areas. Each of these field units is staffed with four to seven engineers and scientists who have had extensive experience in water pollution control work. The accompanying map shows the basin areas. The Environmental Health Center at Cincinnati serves as the research facility on water pollution problems.

Thus far \$5.38 million has been made available for Public Health Service activities under the act. An additional \$2.9 million has been provided for grants to State and interstate agencies for industrial waste research and investigations, and \$4 million, the full amount authorized, has been provided for the new Environmental Health Center research facility at Cincinnati, construction of which is about 65 percent completed. No funds have been

Mr. Schwob has been chief of the Division of Water Pollution Control, Bureau of State Services, Public Health Service, since its creation in 1948. Mr. Dworsky is chief of the reports and education branch of the division.



made available for the extension of Federal credit to assist local communities in the construction of treatment works.

In general, the multiple functions of the Division of Water Pollution Control fall into three broad categories: planning and development of comprehensive programs, execution of the programs, and technical services and research. Some of the activities, however, fall partly into one and partly into another of these groups.

Drainage Basin Reports

During 1949 and 1950, water pollution data available from State and Federal sources were assembled and analyzed. The information, covering 226 river basins in the United States, of which 146 are interstate, has been made available in 15 drainage basin reports, representing joint statements of the Public Health Service and the States involved. These reports provide, for the first time for most of the Nation, the names of the cities and industries that are creating pollution and are thus responsible for its abatement.

The data in these reports have been sum-

marized and published in a national inventory of the water pollution problem, "Water Pollution in the United States." This summary indicates that in July 1950 there were more than 22,000 sources of pollution in the United States—11,800 municipal sewer systems and 10,400 independent factory waste outlets. It reports further that despite the reduction of pollution by 9,300 treatment plants in operation, including 6,700 municipal and 2,600 industrial plants, wastes still discharged into rivers and lakes are equivalent to those from a population of over 150,000,000. To handle this volume of polluting wastes, 6,600 more municipal sewage treatment plants or additions to present plants and 3,500 more industrial waste treatment plants or additions will be required. An estimated \$9 billion to \$12 billion in public and private investments will be necessary over the next decade to meet these needs and to keep up with industrial expansion and population growth.

Reporting and Education Program

Often in the past it has not been possible, even after publication of reports and surveys, to

press forward on developing methods and procedures for making use of the facts. The reporting and education program developed under the provisions of the Water Pollution Control Act has made good progress toward getting the facts before the people who are in a position to use them.

Through the official State water pollution control agencies, the drainage basin reports are being made available to local community leaders and organizations, since the people in each community must take the steps necessary for the solution of their own problems. Many national organizations, such as the General Federation of Women's Clubs, the Rotary Clubs, the Kiwanis Clubs, and the Izaak Walton League of America, are also helping to get this information to the local communities.

In connection with the assembling of data, assistance has been given to State and interstate agencies in the conduct of studies, surveys, and investigations. Surveys of more than 88 streams and coastal water areas and investigations of almost 150 technical pollution problems have been made. By thus pooling State and Federal resources it has been possible to carry out many studies which, alone, neither the Public Health Service field staff, State nor interstate personnel would have been able to undertake.

Uniform State Policies

After analyzing existing State water pollution control laws and after consultation with State and municipal groups, conservationists, industrialists, and other individuals interested in water pollution control, the Public Health Service developed a Suggested State Water Pollution Control Act. The Council of State Governments endorsed and recommended it to the States for favorable consideration. Even before this model law was fully developed, the Service made its staff available to States requesting information on proposed legislation, and it is continuing this practice.

Although most State legislatures have met only once since the development of the suggested act, its principles have already been utilized in enacting new water pollution control legislation or major amendments to existing legislation by Arkansas, Illinois, Kentucky, North

Carolina, Ohio, South Carolina, and Vermont. Specific principles of the act have been reflected in legislation which strengthened the water pollution laws of Maine, Minnesota, New Hampshire, and Tennessee, and legislation based in large measure on the suggested act has been prepared for or introduced in the legislatures of many other States (Arizona, Colorado, Idaho, Missouri, Montana, Nevada, and Utah are examples). Thus progress toward achieving uniformity in the policies of the various States is being made.

The Public Health Service works closely with other Federal agencies on water resource problems by providing basic data on water quality, water use, and water pollution control measures, and by participating in the activities of the Federal Inter-Agency River Basin Committee and several similar field committees in various areas of the country.

Interstate Problems

During the first 3 years of operation, no formal enforcement action was attempted. Nevertheless, the Public Health Service has worked directly with a number of State agencies toward solution of interstate pollution problems. The Water Pollution Control Act has been important in making it possible for the Service, acting as a third party, to assist in solving interstate problems without resorting to the act's formal enforcement proceedings.

Assistance has been given in the formation of regional pollution control councils in areas not covered by formal interstate compact groups. Such councils now exist in six drainage basin areas. Acting in an advisory capacity, they provide a means for facilitating cooperative action by the States in a manner similar to that provided by the 10 interstate agencies which have formal compact arrangements. The Pacific Northwest Pollution Control Council, for example, has brought about the adoption in its area of uniform water quality objectives and treatment works design standards.

Grants to States

To help in the execution of the State water pollution control programs, the Congress made

available grants to the States for studies, surveys, and research on water pollution caused by industrial wastes. As a result State activities have been substantially increased in both dollars and manpower (see table). In 1950 the States spent slightly more than \$2 of their own funds for each dollar provided by Federal grants. By 1952 they were proposing to spend almost \$4.50 of their own funds for each dollar of the Federal grants. By 1952 the number of professional personnel employed by the States for water pollution control activities had increased 71 percent over the total for 1949.

State funds expended and personnel employed by State water pollution control agencies, 1949-52

Year	State expenditure (excluding Federal grants)	Total professional and scientific personnel	Professional and scientific personnel employed for industrial waste studies
Total	\$9, 243, 550	-----	-----
1949	(¹)	307	(¹)
1950	2, 242, 478	418	173
1951	2, 984, 492	440	234
1952 ²	4, 016, 580	525	285

¹ No data available.

² Estimated.

Approximately 70 percent of the grant funds have been expended in studies and investigations of existing industrial pollution problems. In the first 2 years of the grant program, more than 260 major stream surveys were made by the States. These involved comprehensive sampling, laboratory analyses, location of pollution sources, and determination of effects on the stream. In addition, well over 3,000 individual pollution problems caused by the wastes of specific industrial plants were investigated.

The basic facts obtained through these field investigations permitted many States to accelerate determinations of pollution control measures required for industrial waste pollution sources, and they will be useful in stimulating needed construction.

Expanding field activity made it necessary

for many States to enlarge laboratory facilities. Approximately 15 percent of the grant moneys were utilized for this purpose. Nineteen States have established new or expanded existing laboratory facilities, seven of them utilizing field laboratory trailers. Twenty-five other States have supplemented their laboratory equipment. The bacteriologists, chemists, and biologists added to staff the laboratories enabled some States for the first time to support adequately the activities of their sanitary engineering personnel.

Most of the State water pollution control agencies have felt that their greatest need was additional information in regard to the location and strength of industrial waste pollutants and the effects of these discharges in the receiving waters. Eighteen States have utilized grant funds for actual research on industrial wastes, and a considerable number of other States are supporting research programs with State appropriations. These studies include the phosphate mining and citrus wastes of Florida; the potato starch wastes of Idaho; the synthetic resin, paper de-inking, dye and textile wastes of Massachusetts; the vegetable and fish canneries wastes in Washington; and the metal-plating industry wastes in Ohio. Approximately 15 percent of the total grant funds have been utilized for research purposes.

Technical Services

The phrase "provide technical service" no longer means, as it once did, the assignment of a single, well-qualified individual to study a problem and produce an answer. In water pollution, as in so many of the problems in the world today, one science merges with another—chemistry with biology, biology with physics, and so on. In searching for ways to overcome pollution, there is need for a coordinated approach. The assistance which the Federal Government today extends to States, industries, and others under the heading "technical service," is really the combined services of sanitary and chemical engineers, biologists, and bacteriologists—men representing many branches of scientific knowledge.

For example, assistance has been requested in reviewing proposed programs and activities of

the States, in guiding the development of uniform water quality standards, and in determining beneficial water uses for subbasin areas.

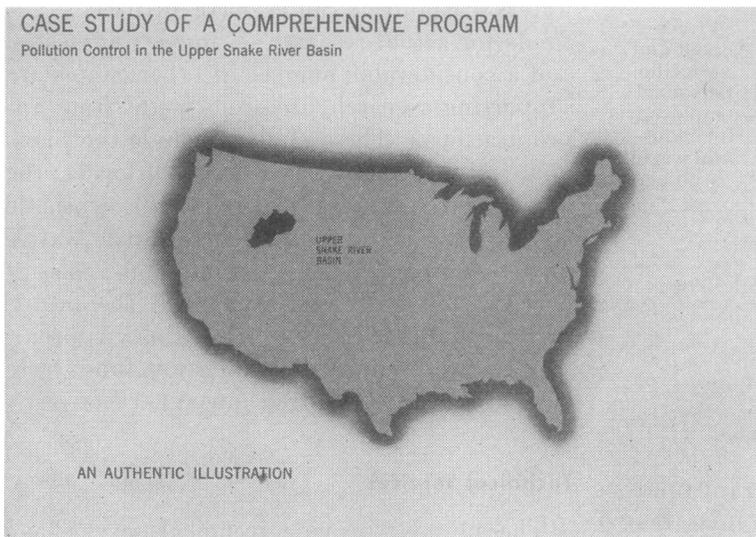
Requests are continually received for field technical people to participate in conferences, technical meetings, and similar discussions on a wide variety of pollution problems: (a) methods of controlling nuisance growths of algae and other aquatic vegetation which interfere with recreational uses of water; (b) effects of sewage-polluted irrigation water on public health; (c) causes of fish mortality; (d) toxicity of insecticides on aquatic life; (e) effects of industrial wastes on public water supply and on fish life; and (f) possible utilization of certain industrial wastes.

An illustration of the kind of technical service provided relates to the pulp and paper industry. The Public Health Service has worked with industry officials and with the States in determining sites for new pulp mills in the Pacific Northwest and in Alaska in order to safeguard the valuable salmon and other migratory fish which are found in these areas.

National Technical Task Committee

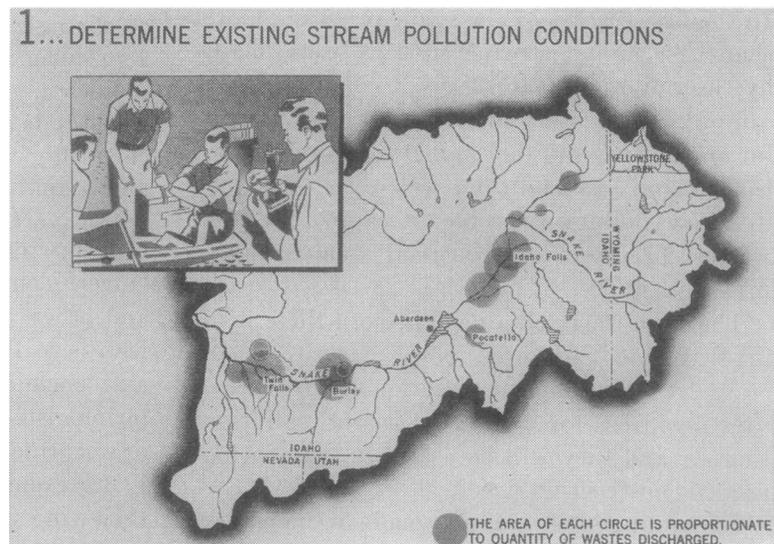
In keeping with the stress placed by the Congress on helping solve industrial waste problems, particularly those concerning industrial wastes for which there are now no known effective treatments, the National Technical Task

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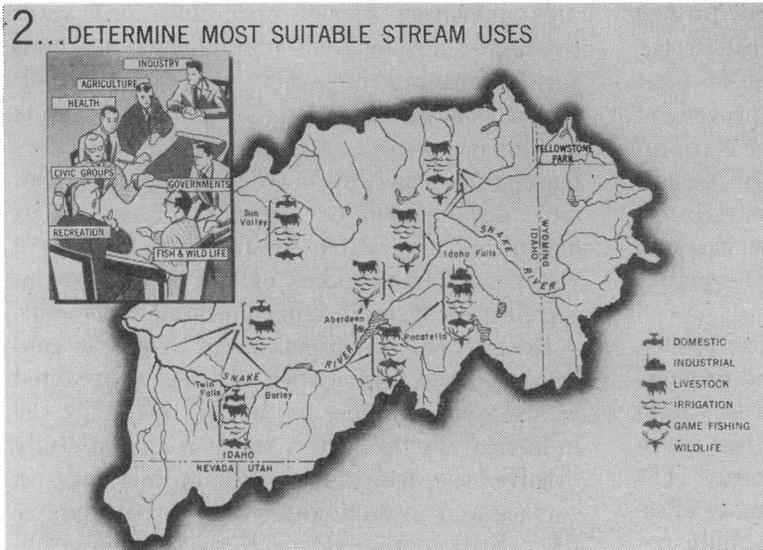


The following illustrations describe the steps in the development of a comprehensive program of water pollution control. The Upper Snake River Basin, which crosses four State lines, is used as an example. (Illustrations reproduced from "Environment and Health," Public Health Service Publication No. 84, 1951.)

Technicians must seek out sources of pollution and determine the amount and kind of pollution in each case. If necessary, laboratory data are developed to clarify understanding of the sources, character, and effect of pollution.



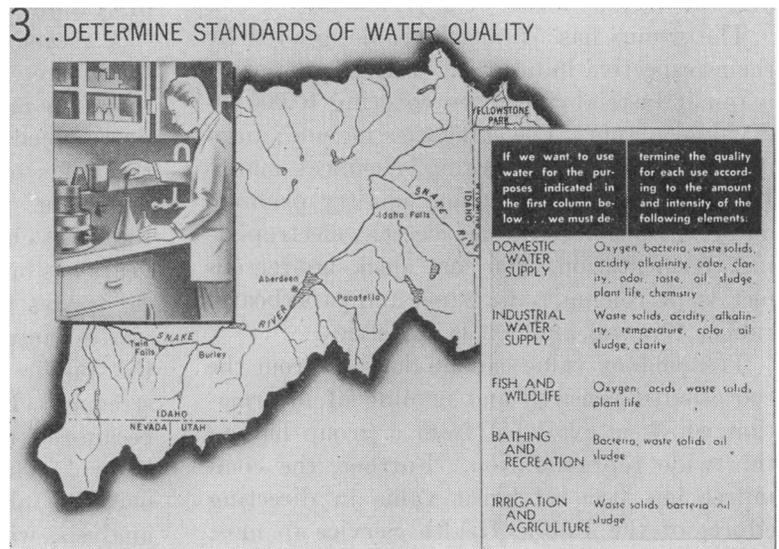
2...DETERMINE MOST SUITABLE STREAM USES



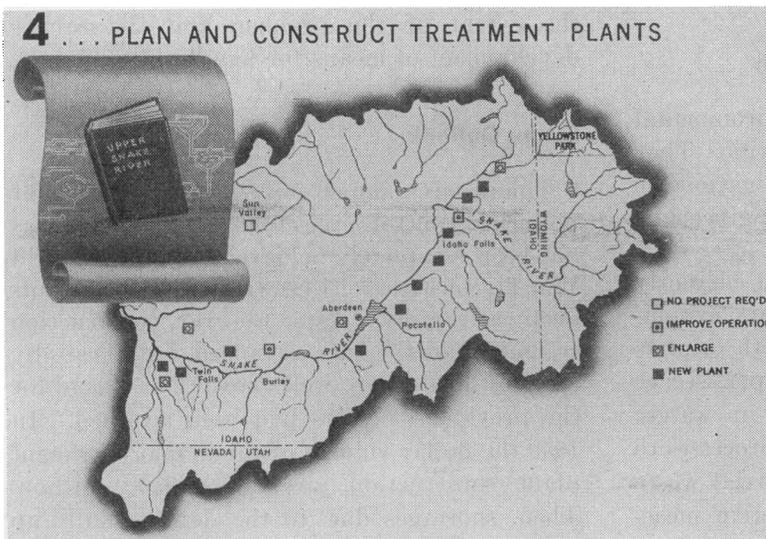
The best use of the waters of streams must be determined before waste treatment plants are built because treatment of wastes will vary according to the quality of the water desired. Water pollution control authorities help by gathering, reviewing, revising, and interpreting data.

In any program of water pollution control, water quality standards for the legitimate uses of our waterways must be established. Oxygen, bacteria, waste solids, acidity, alkalinity, color, clarity, and taste are among the elements to be considered.

3...DETERMINE STANDARDS OF WATER QUALITY



4... PLAN AND CONSTRUCT TREATMENT PLANTS



Once the sources and amount of pollution are determined and decisions made as to the most suitable water uses, steps are taken to determine the degree of treatment required at each source of pollution. The construction of treatment plants can be expedited by industry, municipalities, and State, interstate, or Federal authority.

Committee on Industrial Wastes was formed on invitation of the Surgeon General of the Public Health Service in May 1950. To meet its broad objective of "effecting an improvement in the quality of water resources in the Nation," the Committee undertook "to perform technical tasks pertaining to industrial wastes in cooperation with the Public Health Service and all others concerned with improving the quality of our water resources."

The functions of the committee are, briefly, to inventory, appraise, coordinate, and promote research and development work, and to stimulate further adoption of known practical methods of pollution control and treatment. The committee also seeks to bring about more effective working relationships between industry and the various levels of government.

The group has 57 members, designated by their respective industries. They represent 36 major industrial categories, covering 10,000 individual plants. The categories include: automotive, beet sugar, canning, chemical manufacturing, mining, meat and poultry packing, dairy products, distilling, electric, electroplating, fermentation, iron and steel, nonferrous metals, petroleum, pulp, paper and paperboard, rubber, tanning, and textile industries.

Tremendous value can be derived from the coordinated research and pooling of information which is available from a group having this wide representation. Further, the committee has been of great value in directing efforts of the Public Health Service to most needed areas.

Environmental Health Center Research

The research activities of the Environmental Health Center are complex and scientific. They extend over a wide range of investigations in the fields of chemistry, physics, engineering, and biology.

Some of the areas in which work is currently in progress include the development and evaluation of analytical techniques for both organic and inorganic materials; studies of persistence of particular organic compounds in water; application of biological oxidation processes to waste purification; studies of industrial waste sources, characteristics, and corrective meas-

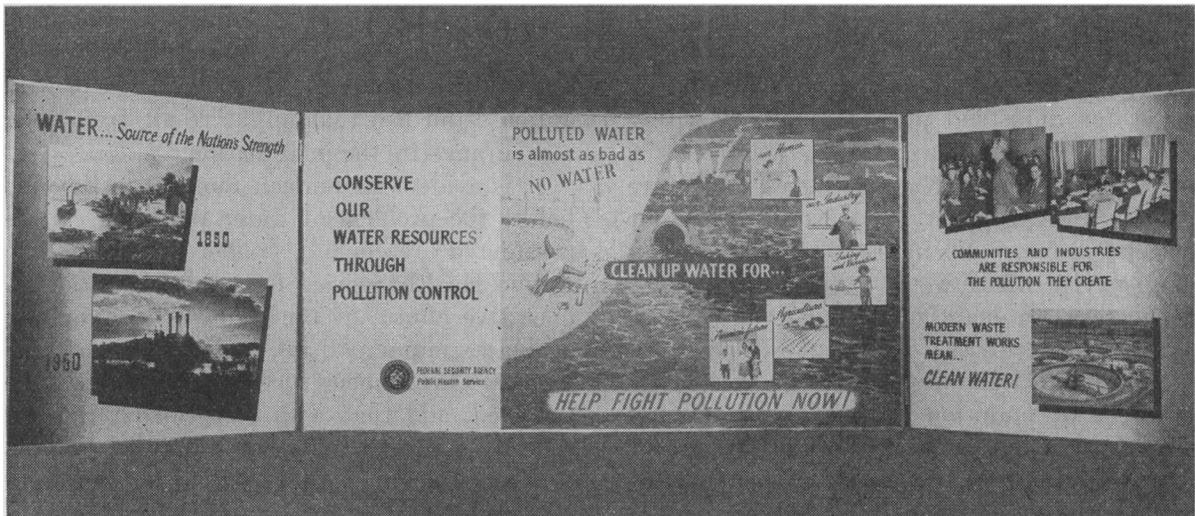
ures; inventory surveys on pollution of water resources; development of biological methods for determining the severity and extent of pollution; studies of toxicity of water pollutants to aquatic life; development of bio-assay methods and their application to pollution control; development of methods for control of organisms responsible for tastes and odors in water supplies; studies of the pollution and purification of shellfish in aquatic environments.

Recent field investigations of synthetic rubber, steel, and kraft paper mill wastes are cited as examples of specific studies made in the industrial wastes field. Another current study involves the determination of radioactivity in surface and ground water and in fresh water life. Still another relates to the determination of cyanide in water and wastes.

A recent product of Environmental Health Center research is a greatly simplified technique for measuring chemicals in water. This new procedure is a significant contribution to the fields of public health and water supply operation. The rapid expansion of this country's chemical industry during the past 10 years has brought increasing burdens of chemical wastes to our streams. Frequently, those wastes cause serious taste and odor problems in the public water supplies drawn from the streams. Possible hazards to public health because of these foreign chemicals are yet unknown. The advantages of the new technique over the old test-tube processes of chemical analysis, with respect to both cost and speed, will permit more rapid progress in determining the extent of the problem and the earlier development of means for handling it.

Future Outlook

The progress hoped for at the time the water pollution control program was developed has not been completely achieved. During World War II, construction of sewage treatment plants declined rapidly. After the war, construction resumed and the rate advanced fairly rapidly until by 1950 a rate well above the average for the previous 35 years had been attained. In 1950 the dollar volume of municipal treatment plant construction was about \$200 million. Then, shortages due to the defense build-up



Now available on loan is this three-panel exhibit recently developed by the Division of Water Pollution Control. It highlights the importance of pollution abatement in conserving our water resources and stresses the responsibility of communities and industries for cleaning up the pollution they create. Featured on the center panel is the five-color poster, "Help Fight Pollution Now!" The exhibit has been shown at several national conventions. Each drainage basin

office has a similar exhibit for use within its area.

The exhibit is designed for ease in handling. With the two end wings folded across the center panel (6' x 3') and the legs and lights (not shown) detached, the complete exhibit can be packed in one case weighing approximately 225 pounds. For information concerning availability and conditions under which this exhibit may be borrowed, write to: Division of Water Pollution Control, Public Health Service, Washington 25, D. C.

placed obstacles in the way of sewage works construction, and in 1951 the volume dropped to about \$175 million. Tentative figures covering the first two quarters of 1952 indicate that this year's rate may be slightly lower than that for 1951. An annual rate of construction almost three times that attained in 1951 will be required over the next decade in order to eliminate the backlog of municipal treatment plant needs and meet current needs as they arise.

Although data are not now available on progress in the abatement of industrial pollution, general indications point to the necessity of substantial acceleration.

Adding urgency to the need for elimination of industrial wastes from the streams, particularly those new types resulting from relatively recent developments in chemical and allied industries, is the realization that not only do those wastes destroy or reduce the usefulness of the streams they enter, they also pose problems in the treatment of public water supplies. Existing water purification methods have been notably successful in removing from drinking

water supplies the contamination caused by organic wastes. However, knowledge is limited as to the effectiveness of known methods of treatment for the many new types of pollutants—chemicals, phenols, synthetics, pharmaceuticals, and radioactive materials. There have already been numerous instances of taste and odor problems arising in public water supplies exposed to even minute quantities of such wastes. Basic information as to the physiological effects of such contamination is also lacking. Treatment of those wastes at the source, before they enter the streams, would remove this hazard to health and a complex water treatment problem.

If this country is to maintain its existence as a highly industrialized and urbanized nation, waste treatment works must be considered not as single-shot operations but as permanent facilities which must be maintained and preserved. Otherwise, water, the lifeblood of the Nation, will suffer, and all the difficulties that face a nation that has destroyed its water resources will follow.

The National Association of Manufacturers' report, "Water in Industry," has clearly stated the viewpoint of industry: "A shortage of water for industrial purposes—just as surely as a shortage of manpower, of materials, or of capital—could defeat our hopes for future growth and prosperity and even imperil our national safety. No industry or business can long survive where water is unavailable or inadequate as to quantity and quality."

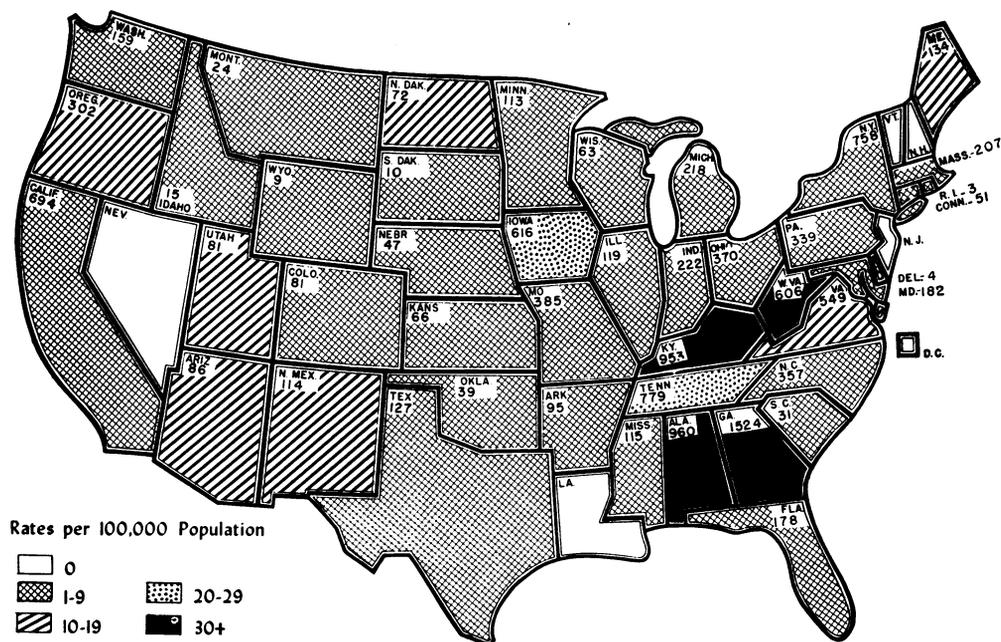
The report of the President's Water Resources Policy Commission, referring to the importance of pollution control to recreational uses of water, said: "No other phase of a water resources program promises so much toward expanding outdoor recreation opportunities as the cleaning up of our rivers."

On the need for pollution abatement to protect our fish and wildlife resources, the com-

mission commented: "Plainly, a pollution abatement program is essential to the future of our wildlife resources. The abundance of wild animals and fish that might result from such a program stirs the imagination."

It is evident that much remains to be done before the problem of water pollution can be considered reasonably under control. The Public Health Service feels that with the cooperative efforts of the States, the interstate agencies, municipalities, industries, and the Federal Government success must and will be achieved, and that with respect to water resources, at least, this generation will be able to meet the requirements set up by Theodore Roosevelt, when he said: "The Nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value."

Incidence of Infectious Hepatitis by State



Regular weekly reporting by States of the number of cases of infectious hepatitis began in 1952.

The provisional total for the first 39 weeks of 1952 is 11,868 cases. All States reported except New Hampshire, New Jersey, Nevada, Vermont, and the District of Columbia. Georgia reported the largest number—1,524 cases. See map for

distribution of cases and rates (per 100,000 population) by State for the first 39 weeks of 1952.

Although comparable statistical data are not available for previous years, the distribution of the disease has not been different from that described in textbooks.

The incidence of the disease in 1952 was highest in the winter and

spring months. Epidemics have been reported most frequently from States with large rural populations. Many cases were found in school populations. In most instances, epidemiological evidence has pointed to a person-to-person spread of infection, although two outbreaks were reported where water was regarded as the vehicle of infection.